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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/632,080	NAKAMURA ET AL.	
	Examiner	Art Unit	
	DANIEL ZEILBERGER	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/19/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed July 21 2008 have been fully considered but they are not persuasive.

Applicant argues that "in contrast to the conductive case member which surrounds the sensor array according to claims 1 and 39, Morikawa et al merely discloses two sheets of rectangular electrodes 31a and 31b provided on respective portions of a sensor array" (page 24 of applicant's reply). The examiner first notes that the second electrode disclosed in Morikawa is indeed conductive, as is disclosed in paragraph 276. In addition, the examiner notes that the feature of "the conductive case member which surrounds the sensor array" is an obvious feature, taught by Setlak, and discussed below.

Applicant argues that "neither of the electrodes 31a and 31b of Morikawa et al is a conductive case member, and it is respectfully that neither of the electrodes 31a and 31b of Morikawa et al surrounds the sensor array" (page 24 of applicant's reply). The discussion in the paragraph above addresses both of these claims.

Applicant argues that "Morikawa et al does not disclose, teach or suggest a second detection electrode as recited in amended independent claims 1 and 39" (page 24 of applicant's reply). The discussion in the paragraph above, and the rejection below, addresses these claims.

Applicant argues that "even if, Fig. 47 of Morikawa et al could reasonably be considered as disclosing the structure of the second detection electrode of claims 1 and

39, the first detection electrode of claims 1 and 39 would then not be disclosed or suggested" (page 25 of applicant's reply). This argument however is moot, since the electrode 31a coincides with the first electrode, 31b coincides with the second electrode, and the second electrode surrounding the array is obviated by Setlak, whereas in the applicant's analysis electrode 31a is taken to be the second electrode, which the examiner has not done.

Applicant argues that "this detection performed with the structure of claim 1 and the method fo [sic] claim 39 differs from detecting a change in impedance of an electrode to which a signal is directly applied, as disclosed by Morikawa et al." (page 26 of applicant's reply). The examiner does not dispute that Morikawa detects a change in impedance, however Morikawa detects a change in impedance *by detecting a change in voltage level*. Indeed applicant's own invention has its voltage level change due to a change in impedance as well.

Applicant argues that "according to Setlak et al, the sensing electrode 78 is an electrode for fingerprint reading, and it is respectfully submitted that Setlak et al does not disclose or suggest the second detection electrode as recited in amended independent claims 1 and 39" (page 27 of applicant's reply). However, the examiner relies the electrode 31b as the second detection electrode wherein the feature of the electrode surrounding the array is obviated by the conductive strip electrode 54, and thus the sensing electrode 78 has no bearing on the claimed second electrode.

Applicant argues that "according to amended independent claims 1and 39, upon contact of the detecting object with both the first and second detection electrodes, these

electrodes are connected such that a part of a signal excited to the first detection electrode is propagated to the second detection electrode so that a signal being excited to the second detection electrode changes. It is respectfully submitted that Setlak et al does not disclose, teach or suggest this structure and method for detecting a detecting object as recited in amended independent claims 1 and 39" (page 28 of applicant's reply). However, this argument is moot since Morikawa discloses this limitation.

Applicant argues that "According to amended independent claims 1 and 39, moreover, it is determined whether the detecting object brought into contact is a specific detecting object based on a voltage level value of a third signal waveform excited to the second detection electrode upon contact of the detecting object. By contrast, it is respectfully submitted that Setlak et al merely describes detecting the fingerprint of the finger 79 based on signals to the sensing electrode 78" (pages 28-29 of applicant's reply). However, this argument is moot since Morikawa discloses this limitation.

Applicant argues that "It is respectfully submitted that, Setlak et al also does not disclose or suggest the structure and method for detecting the contacting of a detecting object and for determining whether the detecting object is a specific detecting object, as recited in amended independent claims 1 and 39" (page 29 of applicant's reply). However, this argument is moot since Morikawa, in view of Setlak, disclose "the structure and method for detecting the contacting of a detecting object and for determining whether the detecting object is a specific detecting object, as recited in amended independent claims 1 and 39", rather than just Setlak.

Claim Objections

2. Claim 21 is objected to because of the following informalities: line 10 contains a grammatical error, wherein "number times" appears as though it should read --number of times--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. *Claims 1 and 39* are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, **claim 1** lacks proper antecedent basis for claimed "the second electrode" in line 29 of the claim. Appropriate correction is required, however for the purposes of examiner "the second electrode" will be interpreted as --the second detection electrode--.

Regarding **claim 39**, the claim lacks proper antecedent basis for claimed "the second signal electrode" in line 20 of the claim. Appropriate correction is required, however for the purposes of examiner "the second signal electrode" will be interpreted as --the second detection electrode--.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. *Claims 1-28, 39-44* are rejected under 35 U.S.C. 103(a) as being unpatentable over Morikawa et al. (US Patent Application Publication 2001/0030324) in view of Setlak et al. (US 5,828,773), hereinafter referenced as Morikawa and Setlak respectively.

Regarding **claim 1**, Morikawa discloses an image reading apparatus (see paragraph 244), comprising:

a detecting surface adapted to have a detecting object placed thereon (see paragraph 277 and figure 43, wherein a finger comes into contact with the electrostatic electricity discharging and contact sensing electrode 31);

a sensor array comprising a plurality of sensors arranged to read an image pattern of the detecting object placed on the detecting surface (see paragraph 275);

a first detection electrode, which is provided at least on an upper portion of the sensor array, and which comprises the detecting surface (see electrode 31a in paragraph 276 and figure 47);

a second detection electrode which comprises a conductive case member, the second detection electrode being electrically insulated and spaced apart from the first detection electrode (see paragraph 247, wherein it is disclosed that ITO is conductive, and further see electrode 31b in paragraph 276 and figure 47);

a signal voltage applying circuit which applies a signal voltage having a first signal waveform that varies periodically to excite a second signal waveform to the first detection electrode (see paragraphs 278 and 281);

a contact detector which comprises a detecting circuit for detecting a third signal waveform excited to the second detection electrode upon contact of the detecting object with both the first detection electrode and the second electrode (see figure 47 and paragraphs 280 and 281, wherein a detection signal supplied by the contact detector 170 is deviated with the human body via the finger to flow to the electrode 31b and further flow to wiring L2, wherein the contact detector 170 detects a change in the level of the detection signal which flows from the wiring L1 to the wiring L2 to detect that the

finger has come into contact between electrodes 31a and 31b), the contact detector determining whether the detecting object brought into contact with the detecting surface is a specific detecting object based on a voltage level of the third signal waveform (see paragraph 281, wherein the contact detector detects a change in impedance resulting from the resistance value by the human body including the finger between the electrodes 31a and 31b from a change in the level of the detection signal which flows from the wiring L1 to the wiring L2).

Morikawa fails to disclose a second detection electrode which comprises a conductive case member "that surrounds the sensor array", the second detection electrode being electrically insulated and spaced apart from the first detection electrode, "a counter electrode which is provided at a lower side of the first detection electrode that is on an opposite side of the first detection electrode from the detecting surface, the counter electrode being opposite to the lower side of the first detection electrode with an interlayer insulating film provided therebetween", and "a signal voltage applying circuit which applies a signal voltage having a first signal waveform that varies periodically to the counter electrode to excite a second signal waveform to the first detection electrode through the interlayer insulating film". However, the examiner maintains that it was obvious at the time of the invention, as taught by Setlak, to provide:

a second detection electrode which comprises a conductive case member "that surrounds the sensor array", the second detection electrode being electrically insulated and spaced apart from the first detection electrode (see conductive strip electrode in

figure 3 and column 5 lines 53-64, wherein the electrode is placed surrounding the entire array such that there is a greater probability of the finger touching the electrode as opposed to only partially surrounding the array as in Morikawa);

a counter electrode which is provided at a lower side of the first detection electrode that is on an opposite side of the first detection electrode from the detecting surface, the counter electrode being opposite to the lower side of the first detection electrode with an interlayer insulating film provided therebetween (see drive electrode layer 71 in figure 7 and column 6 lines 46-48, wherein the drive electrode is on an opposite lower side of the sensing electrode with an insulating layer between the two electrodes);

a signal voltage applying circuit which applies a signal voltage having a first signal waveform that varies periodically to the counter electrode to excite a second signal waveform to the first detection electrode through the interlayer insulating film (see excitation drive amplifier 74 in figure 7, 8 and 9, and further see column 6 lines 38-42, wherein the excitation drive amplifier 74 applied a signal in the range of 1KHz to 1MHz to the drive electrode layer 71, and further see column 6 line 66 through column 7 line 12, wherein the excitation electrode 71 generates a first electric field to the sensing electrode 78).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Morikawa, by specifically providing a second detection electrode which comprises a conductive case member "that surrounds the sensor array", the second detection electrode being electrically insulated and spaced apart

from the first detection electrode, "a counter electrode which is provided at a lower side of the first detection electrode that is on an opposite side of the first detection electrode from the detecting surface, the counter electrode being opposite to the lower side of the first detection electrode with an interlayer insulating film provided therebetween", and "a signal voltage applying circuit which applies a signal voltage having a first signal waveform that varies periodically to the counter electrode to excite a second signal waveform to the first detection electrode through the interlayer insulating film", as taught by Setlak, for the purpose of increasing the probability of the finger touching the electrode, and further for the purpose of obtaining an output signal that varies according to the distance between the finger and the electrode on the surface of the sensor (first detection electrode) using a capacitive voltage divider in order to prevent spoofing of the device with an object that does not have the same capacitive characteristics as finger skin (see column 7 lines 3-12).

Regarding **claim 2**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. In the embodiment discussed above Morikawa fails to disclose claimed "a drive controller which supplies a predetermined drive control signal to each sensor of the sensor array to perform an image reading operation of the image pattern of the detecting object placed on the detecting surface". However, in another embodiment Morikawa discloses:

a drive controller which supplies a predetermined drive control signal to each sensor of the sensor array to perform an image reading operation of the image pattern

of the detecting object placed on the detecting surface (see controller 160 in paragraph 203).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art to modify the combination of Morikawa and Setlak, by specifically providing claimed "a drive controller which supplies a predetermined drive control signal to each sensor of the sensor array to perform an image reading operation of the image pattern of the detecting object placed on the detecting surface", for the purpose of creating fingerprint image data.

Regarding **claim 3**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 2. In addition, Morikawa discloses:

wherein the drive controller controls the image reading operation based on a result of the determination by the contact detector of whether the detecting object is the specific detecting object (see photography start signal in paragraph 281).

Regarding **claim 4**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. In addition, Morikawa discloses wherein each sensor of the sensor array comprises a photosensor (see paragraphs 244 and 245).

In the embodiment discussed above Morikawa fails to disclose claimed "the first detection electrode and interlayer insulating film transmit light ". However, in another embodiment Morikawa discloses:

the first detection electrode and interlayer insulating film transmit light (see paragraphs 134 and 194).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art to modify the combination of Morikawa and Setlak, by specifically providing claimed "the first detection electrode and interlayer insulating film transmit light", for the purpose of allowing light to pass through the insulating film 30 and the contact sensing electrode 31 in order to allow a fingerprint to be imaged onto the photosensors.

Regarding **claim 5**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 4. In the embodiment discussed above Morikawa fails to disclose claimed "wherein the first detection electrode comprises a transparent conductive film formed on the upper portion of the sensor array with the interlayer insulating film provided between the upper portion of the sensor array and the transparent conductive film, and the photosensors receive light through the first detection electrode and the interlayer insulating film". However, in another embodiment Morikawa discloses:

wherein the first detection electrode comprises a transparent conductive film formed on the upper portion of the sensor array with the interlayer insulating film provided between the upper portion of the sensor array and the transparent conductive film, and the photosensors receive light through the first detection electrode and the interlayer insulating film (see figure 23 and paragraphs 134 and 194).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art to modify the combination of Morikawa and Setlak, by specifically providing claimed "wherein the first detection electrode comprises a transparent conductive film formed on the upper portion of the sensor array with the interlayer insulating film provided between the upper portion of the sensor array and the transparent conductive film, and the photosensors receive light through the first detection electrode and the interlayer insulating film", for the purpose of allowing light to pass through the insulating film 30 and the contact sensing electrode 31 in order to allow a fingerprint to be imaged onto the photosensors.

Regarding **claim 6**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 5. In addition, Morikawa discloses:

wherein the transparent conductive film comprises indium-tin oxide (see paragraph 276).

Regarding **claim 7**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. In addition, Morikawa discloses:

wherein the first detection electrode comprises a conductive film formed on the upper portion of the sensor army (see paragraph 276 and figure 43).

Regarding **claim 9**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. In addition, Morikawa discloses:

wherein the specific detecting object is a part of a human user, and the image pattern read be the sensor array is an image pattern specific to the human user (see finger in paragraph 272 and fingerprint in paragraph 275).

Regarding **claim 10**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. In addition, Morikawa discloses:

wherein the first detection electrode and the second detection electrode are arranged such that the detecting object is laid across the first detection electrode and the second detection electrode to be brought into contact therewith (see paragraph 277, wherein the contact detector 170 detects that the finger comes into contact with the electrostatic electricity discharging and contact sensing electrode 31, wherein the finger is arranged on the predetermined photography position).

Regarding **claim 11**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. In addition, Morikawa discloses:

An amplitude limiting circuit which defines upper and lower limit voltage values of the second signal waveform excited to the first detection electrode (see diode circuit 151 in paragraphs 283-285).

Regarding **claim 12**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 11. In addition, Morikawa discloses:

wherein the amplitude limiting circuit comprises an anti-parallel diode circuit provided between the first detection electrode and a ground potential, and the amplitude limiting circuit defines the upper and lower limit voltage values of the second signal waveform excited to the first detection electrode based on forward voltages of respective diodes that form the anti-parallel diode circuit (see diode circuit 151 in paragraphs 283-285).

Regarding **claim 13**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. While the combination as disclosed above does not disclose "wherein the signal voltage applying circuit applies, to the counter electrode, a signal having a predetermined voltage amplitude and two periodical voltage levels", the examiner maintains that it would have been obvious to one of ordinary skill in the art to provide:

wherein the signal voltage applying circuit applies, to the counter electrode, a signal having a predetermined voltage amplitude and two periodical voltage levels (see column 6 lines 35-45, wherein an AC signal is applied to the drive electrode layer, wherein it would be obvious that an AC signal has a predetermined voltage amplitude, and at least two periodical voltage levels depending on the shape of the signal, since it is widely known in the art that an AC signal with one frequency would indeed have a predetermined voltage amplitude and at least two periodical voltage levels).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art to modify the combination of Morikawa and Setlak, by specifically

providing claimed "wherein the signal voltage applying circuit applies, to the counter electrode, a signal having a predetermined voltage amplitude and two periodical voltage levels", for the purpose of applying a standard AC signal to the drive electrode layer to obtain an output signal that varies according to the distance between the finger and the electrode on the surface of the sensor using a capacitive voltage divider in order to prevent spoofing of the device with an object that does not have the same capacitive characteristics as finger skin.

Regarding **claim 14**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. Morikawa fails to specifically disclose claimed "wherein the contact detector determines whether the detecting object is the specific detecting object based on a value of a voltage amplitude and a value of a central voltage of the voltage amplitude of the third signal waveform excited to the second detection electrode". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the contact detector determines whether the detecting object is the specific detecting object based on a value of a voltage amplitude and a value of a central voltage of the voltage amplitude of the third signal waveform excited to the second detection electrode (see paragraph 281, wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious to one of ordinary skill in

the art that to detect a change in the level of the detection signal, the amplitude of the detection signal and the central value of the detection signal would be needed).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the contact detector determines whether the detecting object is the specific detecting object based on a value of a voltage amplitude and a value of a central voltage of the voltage amplitude of the third signal waveform excited to the second detection electrode", for the purpose of determining a change in the level of the detection signal so that it can be determined that a finger is between electrodes 31a and 31b.

Regarding **claim 15**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. Morikawa fails to specifically disclose claimed "wherein the contact detector determines whether the detecting object is the specific detecting object based on comparison between: (i) a threshold voltage that is preset based on a capacitance component and a resistance component of the specific detecting object, and (ii) the third signal waveform excited to the second detection electrode". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the contact detector determines whether the detecting object is the specific detecting object based on comparison between: (i) a threshold voltage that is preset based on a capacitance component and a resistance component of the specific

detecting object, and (ii) the third signal waveform excited to the second detection electrode (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in impedance resulting from the resistance value or capacity value by the human body including the finger, wherein this change is determined from a change in the level of the detection signal, wherein it would be obvious to one of ordinary skill in the art that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein since Morikawa discloses that a change in impedance based on the resistance value or capacity value of the finger is detected, it would be obvious that the reference threshold value is based on this resistance value or capacity value).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the contact detector determines whether the detecting object is the specific detecting object based on comparison between: (i) a threshold voltage that is preset based on a capacitance component and a resistance component of the specific detecting object, and (ii) the third signal waveform excited to the second detection electrode", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 16**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 15. Morikawa fails to specifically

disclose claimed "wherein the contact detector determines that the detecting object is the specific detecting object when the threshold voltage is included within a range of a voltage amplitude of the third signal waveform excited to the second detection electrode". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the contact detector determines that the detecting object is the specific detecting object when the threshold voltage is included within a range of a voltage amplitude of the third signal waveform excited to the second detection electrode (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount, wherein this amount would at least fall within the range of the detection signal).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the contact detector determines that the detecting object is the specific detecting object when the threshold voltage is included within a range of a voltage amplitude of the third signal waveform excited to the second detection electrode", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 17**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 15. Morikawa fails to specifically disclose claimed "wherein the threshold voltage is set to a voltage that is higher than an upper limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the threshold voltage is set to a voltage that is higher than an upper limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount, wherein it would be obvious that in order to determine between the two cases of finger presence and no finger presence, the difference from the threshold must be greater than the maximum signal value when no finger is present).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically

providing "wherein the threshold voltage is set to voltage higher than the upper limit value of the third signal waveform excited to the second detection electrode in a state that at least the detecting object comes in no contact with the detecting surface", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 18**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 15. Morikawa fails to specifically disclose claimed "wherein the threshold voltage is set to a voltage that is lower than a lower limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the threshold voltage is set to a voltage that is lower than a lower limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount, wherein it would be obvious that in order to determine between the two cases of finger presence and no finger presence, the

difference from the threshold must be greater than the minimum signal value when no finger is present).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the threshold voltage is set to a voltage that is lower than a lower limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 19**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 15. Morikawa fails to specifically disclose claimed "wherein the contact detector comprises a threshold voltage setting circuit that sets the threshold voltage, and a comparing circuit that compares the threshold voltage and the third signal waveform". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the contact detector comprises a threshold voltage setting circuit that sets the threshold voltage, and a comparing circuit that compares the threshold voltage and the third signal waveform (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to

calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that some circuit would need to set this threshold signal value, wherein it would be obvious that in order to determine a change in the level of the detection signal, a circuit would be need to compare the threshold signal value and the current signal value).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the contact detector comprises a threshold voltage setting circuit that sets the threshold voltage, and a comparing circuit that compares the threshold voltage and the third signal waveform", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 20**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 19. Morikawa fails to specifically disclose claimed "wherein the contact detector determines whether the threshold voltage is included in a range of a voltage amplitude of the third signal waveform based on a result of the comparison by the comparing circuit, and outputs a contact detection signal indicating that the detecting object is the specific detecting object when it is determined that the threshold voltage is included in the range of the voltage amplitude of the third signal waveform". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the contact detector determines whether the threshold voltage is included in a range of a voltage amplitude of the third signal waveform based on a result of the comparison by the comparing circuit (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount, wherein this amount would at least fall within the range of the detection signal, wherein it would be obvious that this comparison would be done by a circuit);

outputs a contact detection signal indicating that the detecting object is the specific detecting object when it is determined that the threshold voltage is included in the range of the voltage amplitude of the third signal waveform (see paragraph 281, wherein it is disclosed that when it is detected that a finger has come into contact with the electrode 31, the contact detector 170 outputs the photography start signal to the controller 160)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the contact detector determines whether the threshold voltage is included in a range of a voltage amplitude of the third signal waveform based on a result of the comparison by the comparing circuit, and outputs a contact detection signal indicating that the detecting object is the specific detecting object when it is determined

that the threshold voltage is included in the range of the voltage amplitude of the third signal waveform", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 21**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 19. Morikawa fails to specifically disclose claimed "wherein the third signal waveform is a waveform that varies periodically, and the contact detector comprises means for detecting whether the third signal waveform has passed the threshold voltage, and a count circuit which counts a number of times that the third signal waveform has passed the threshold voltage, and the contact detector outputs a contact detection signal indicating that the detecting object is the specific detecting object when a number times in a row that the third signal waveform has passed the threshold voltage counted by the count circuit exceeds the preset number of times". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the third signal waveform is a waveform that varies periodically (see paragraph 278, an alternating current signal is supplied to the electrode 31a which inherently is periodical, wherein since the third signal waveform is the signal after it travels through the finger and into the electrode 31b, it will obviously still be periodical);

the contact detector comprises means for detecting whether the third signal waveform has passed the threshold voltage (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b

from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount);

a count circuit which counts a number of times that the third signal waveform has passed the threshold voltage, and the contact detector outputs a contact detection signal indicating that the detecting object is the specific detecting object when a number times in a row that the third signal waveform has passed the threshold voltage counted by the count circuit exceeds the preset number of times (see paragraph 281, wherein since the contact detection 170 detects when a change in the level of the detection signal occurs, in order to detected that a finger has come into contact with the electrode 31, the contact detector 170 outputs the photography start signal to the controller 160, the contact detector necessarily detects at least 1 occurrence of a change in signal level)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the third signal waveform is a waveform that varies periodically, and the contact detector comprises means for detecting whether the third signal waveform has passed the threshold voltage, and a count circuit which counts a number of times that the third signal waveform has passed the threshold voltage, and the contact detector outputs a contact detection signal indicating that the detecting object is the specific detecting object when a number times in a row that the third signal waveform

has passed the threshold voltage counted by the count circuit exceeds the preset number of times", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 22**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. In the embodiment discussed above Morikawa fails to disclose the limitations of claim 22. However, in another embodiment Morikawa discloses:

wherein the sensors comprise photosensors, each of which includes a source electrode and a drain electrode that are formed to sandwich a channel area formed of a semiconductor layer, and a first gate electrode and a second gate electrode that are formed at least on upper and lower portions of the channel area with respective gate insulating films provided between the gate electrodes and the channel area (see figure 15 and paragraphs 143-145, wherein is disclosed a plurality of photosensors, source electrode 27b, drain electrodes 27a and 27c opposite source electrode 27b sandwiching each of the semiconductor layers 24a and 24b, and single top gate electrode 29 formed above the semiconductor layers 24a and 24b via top gate insulating film 28 and single bottom gate electrode 22 formed below the semiconductor layers 24a and 24b via the bottom gate insulating film 23);

a reset pulse is applied to the first gate electrode to initialize the sensor (see paragraph 117);

a precharge pulse is applied to the drain electrode (see paragraph 119);

thereafter a read pulse is applied to the second gate (see paragraph 120);

such that an electrical charge corresponding to an amount of irradiated light is stored in the channel area for charge storing time, which is from an end of initialization to application of the read pulse (see paragraphs 118 and 123);

a voltage corresponding to the amount of thestored charge is output as an output voltage to the channel area (see paragraph 118);

the image pattern of the detecting object placed on the detecting surface is read based on a difference between a signal voltage according to the precharge pulse and the output voltage (see paragraph 123 and figure 11, where it can be seen that the voltage VD will be a difference between the precharge voltage Vpg and a change in voltage due to light accumulation).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art to modify the combination of Morikawa and Setlak, by specifically providing the limitations of claim 22, for the purpose of reading an image from the photosensors.

Regarding **claim 23**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. In the embodiment discussed above Morikawa fails to disclose claimed "wherein the sensors are formed on an insulating substrate that transmits light, a protection insulating film is formed on a side of the sensors opposite to the insulating substrate, and the interlayer insulating film includes

the protection insulating film and the gate insulating films". However, in another embodiment Morikawa discloses:

wherein the sensors are formed on an insulating substrate that transmits light (see paragraph 127, wherein it is disclosed that photosensor 10 is formed on a transparent insulating substrate 21);

a protection insulating film is formed on a side of the sensors opposite to the insulating substrate (see protection insulating film 30 in paragraph 246 and figure 38);

the interlayer insulating film includes the protection insulating film and the gate insulating films (see paragraph 246 and figure 38, wherein the protection insulating film 30 and the gate insulating films 23 and 28 are located between the electrostatic electricity discharging and contact sensing electrode 31 and the transparent insulating substrate 21) .

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art to modify the combination of Morikawa and Setlak, by specifically providing claimed "wherein the sensors are formed on an insulating substrate that transmits light, a protection insulating film is formed on a side of the sensors opposite to the insulating substrate, and the interlayer insulating film includes the protection insulating film and the gate insulating films", for the purpose of allowing light to enter the photosensor and to insulate the different component of the photosensor.

Regarding **claim 24**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 23. In addition, Morikawa discloses:

wherein a transparent conducive film is formed on the protection insulating film, and the first detection electrode comprises the transparent conductive film (see paragraph 276 and figure 38, wherein the electrostatic discharging and contact sensing electrode 31 is an optically transparent electrode formed on a photosensor, wherein electrode 31 is made of electrodes 31a and 31b, wherein electrode 31a is the first detection electrode).

Regarding **claim 25**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 22. In addition, while the combination fails to specifically disclose the limitations of claim 25, the examiner maintains that it would have been obvious to provide:

wherein the counter electrode comprises the drain electrodes, and the first signal voltage applied to the counter electrode by the signal voltage applying circuit is a pulse voltage applied to the drain electrodes (see Morikawa paragraph 119 and figure 3, wherein a voltage pulse is applied to the drain electrode through the drain line, wherein in light of the discussion above in regards to the counter electrode opposite the first detection electrode, wherein the counter electrode excites signals onto the first detection electrode, it would have been obvious that the drain electrode also would have excited signals onto the detection electrode 31, and even further supported in the embodiment of Morikawa in figure 47, wherein only the electrode 31a is on top of the sensors and thus only electrode 31a, the first detection electrode, would be excited).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Morikawa by specifically providing "wherein the counter electrode comprises the drain electrodes, and the first signal voltage applied to the counter electrode by the signal voltage applying circuit is a pulse voltage applied to the drain electrodes", as taught by Morikawa and Setlak, for the purpose of having a functional method of controlling the photosensors.

Regarding **claim 26**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 25. In addition, Morikawa discloses: wherein the pulse voltage is the precharge pulse (see paragraph 119 and figure 3, wherein φpg is the precharge signal, and as can be seen in figure 3 is a pulse).

Regarding **claim 27**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 22. In addition, while the combination fails to specifically disclose the limitations of claim 27, the examiner maintains that it would have been obvious to provide:

wherein the sensor array includes a plurality of drain lines connected to the drain electrodes of the photosensors (see paragraph 256 and figure 38, wherein drain electrodes 27a and 27c are projected from the common drain line 103);

the counter electrode comprises the drain electrodes and the drain lines, and the first signal voltage applied to the counter electrode by the signal voltage applying circuit is pulse voltage applied to the drain lines (see Morikawa paragraph 119 and figure 3,

wherein a voltage pulse is applied to the drain electrode through the drain line, wherein in light of the discussion above in regards to the counter electrode opposite the first detection electrode, wherein the counter electrode excites signals onto the first detection electrode, it would have been obvious that the drain electrode also would have excited signals onto the detection electrode 31, and even further supported in the embodiment of Morikawa in figure 47, wherein only the electrode 31a is on top of the sensors and thus only electrode 31a, the first detection electrode, would be excited).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Morikawa by specifically providing "wherein the sensor array includes a plurality of drain lines connected to the drain electrodes of the photosensors, the counter electrode comprises the drain electrodes and the drain lines, and the first signal voltage applied to the counter electrode by the signal voltage applying circuit is pulse voltage applied to the drain lines", as taught by Morikawa and Setlak, for the purpose of having a functional method of controlling the photosensors.

Regarding **claim 28**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 27. In addition, Morikawa discloses: wherein the pulse voltage is the precharge pulse (see paragraph 119 and figure 3, wherein φpg is the precharge signal, and as can be seen in figure 3 is a pulse).

Regarding **claim 39**, Morikawa discloses a driving method for driving an image reading apparatus including a sensor array having a detecting surface on which a detecting object is placed and drive controller which reads an image pattern of the detecting object placed on the detecting surface (see paragraph 244 and figure 43), the method comprising:

applying a signal voltage having a first signal waveform that varies periodically to excite a second signal waveform to the first detection electrode (see paragraphs 278 and 281);

detecting a third signal waveform, which is excited to a second detection electrode upon contact of the detecting object with both the first detection electrode and the second electrode (see figure 47 and paragraphs 280 and 281, wherein a detection signal supplied by the contact detector 170 is deviated with the human body via the finger to flow to the electrode 31b and further flow to wiring L2, wherein the contact detector 170 detects a change in the level of the detection signal which flows from the wiring L1 to the wiring L2 to detect that the finger has come into contact between electrodes 31a and 31b),

the second signal electrode comprising a conductive case member, being electrically insulated and spaced apart from the first detection electrode (see paragraph 247, wherein it is disclosed that ITO is conductive, and further see electrode 31b in paragraph 276 and figure 47);

determining whether the detecting object brought into contact the detecting surface is a specific detecting object based on a voltage level value of the detected third

signal waveform (see paragraph 281, wherein the contact detector detects a change in impedance resulting from the resistance value by the human body including the finger between the electrodes 31a and 31b from a change in the level of the detection signal which flows from the wiring L1 to the wiring L2);

starting reading of the image pattern by the drive controller when it is determined that the detecting object is the specific detecting object (see paragraph 281, wherein it is disclosed that the contact detector 170 outputs the photography start signal to the controller 160).

Morikawa fails to disclose "applying a signal voltage having a first signal waveform that varies periodically to a counter electrode which is provided on an upper portion of the sensor array such that the counter electrode is provided at a lower side of a first detection electrode which comprises the detection surface at an upper side thereof with an interlayer insulating film provided between the counter electrode and the first detection electrode to excite a second signal waveform to the first detection electrode" and the second signal electrode comprising a conductive case member "that surrounds the sensor array" being electrically insulated and spaced apart from the first detection electrode. However, the examiner maintains that it was obvious at the time of the invention, as taught by Setlak, to provide:

applying a signal voltage having a first signal waveform that varies periodically to a counter electrode (see excitation drive amplifier 74 in figure 7, 8 and 9, and further see column 6 lines 38-42, wherein the excitation drive amplifier 74 applied a signal in the range of 1KHz to 1MHz to the drive electrode layer 71) which is provided on an

upper portion of the sensor array such that the counter electrode is provided at a lower side of a first detection electrode which comprises the detection surface at an upper side thereof with an interlayer insulating film provided between the counter electrode and the first detection electrode (see drive electrode layer 71 in figure 7 and column 6 lines 46-48, wherein the drive electrode is on an opposite lower side of the sensing electrode with an insulating layer between the two electrodes) to excite a second signal waveform to the first detection electrode (see column 6 line 66 through column 7 line 12, wherein the excitation electrode 71 generates a first electric field to the sensing electrode 78);

the second signal electrode comprising a conductive case member "that surrounds the sensor array" being electrically insulated and spaced apart from the first detection electrode (see conductive strip electrode in figure 3 and column 5 lines 53-64, wherein the electrode is placed surrounding the entire array such that there is a greater probability of the finger touching the electrode as opposed to only partially surrounding the array as in Morikawa).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Morikawa, by specifically providing "applying a signal voltage having a first signal waveform that varies periodically to a counter electrode which is provided on an upper portion of the sensor array such that the counter electrode is provided at a lower side of a first detection electrode which comprises the detection surface at an upper side thereof with an interlayer insulating film provided between the counter electrode and the first detection electrode to excite a second signal

waveform to the first detection electrode" and the second signal electrode comprising a conductive case member "that surrounds the sensor array" being electrically insulated and spaced apart from the first detection electrode, as taught by Setlak, for the purpose of increasing the probability of the finger touching the electrode, and further for the purpose of obtaining an output signal that varies according to the distance between the finger and the electrode on the surface of the sensor (first detection electrode) using a capacitive voltage divider in order to prevent spoofing of the device with an object that does not have the same capacitive characteristics as finger skin (see column 7 lines 3-12).

Regarding **claim 40**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 39. Morikawa fails to specifically disclose claimed "wherein the step of determining whether the detecting object is the specific detecting object comprises comparing: (i) a threshold value that is preset based on a capacitance component and a resistance component of the specific detecting object with (ii) the third signal waveform excited to the second detection electrode". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the step of determining whether the detecting object is the specific detecting object comprises comparing: (i) a threshold value that is preset based on a capacitance component and a resistance component of the specific detecting object with (ii) the third signal waveform excited to the second detection electrode (see

paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in impedance resulting from the resistance value or capacity value by the human body including the finger, wherein this change is determined from a change in the level of the detection signal, wherein it would be obvious to one of ordinary skill in the art that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein since Morikawa discloses that a change in impedance based on the resistance value or capacity value of the finger is detected, it would be obvious that the reference threshold value is based on this resistance value or capacity value).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the step of determining whether the detecting object is the specific detecting object comprises comparing: (i) a threshold value that is preset based on a capacitance component and a resistance component of the specific detecting object with (ii) the third signal waveform excited to the second detection electrode", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 41**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 40. Morikawa fails to specifically disclose claimed "wherein comparing the threshold voltage with the third signal waveform comprises determining whether the threshold voltage is included within a range of voltage amplitude of the third signal waveform, and determining that the

detecting object is the specific detecting object when it is determined that the threshold voltage is included within the range of voltage amplitude of the third signal waveform". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein comparing the threshold voltage with the third signal waveform comprises determining whether the threshold voltage is included within a range of voltage amplitude of the third signal waveform, and determining that the detecting object is the specific detecting object when it is determined that the threshold voltage is included within the range of voltage amplitude of the third signal waveform (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount, wherein this amount would at least fall within the range of the detection signal).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein comparing the threshold voltage with the third signal waveform comprises determining whether the threshold voltage is included within a range of voltage amplitude of the third signal waveform, and determining that the detecting object is the specific detecting object when it is determined that the threshold voltage is

included within the range of voltage amplitude of the third signal waveform", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 42**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 40. Morikawa fails to specifically disclose claimed "wherein comparing the threshold voltage with the third signal waveform comprises detecting whether the third signal waveform has passed the threshold voltage, and determining that the detecting object is the specific detecting object when a number of times in a row that the third signal waveform has passed the threshold voltage exceeds a preset number of times". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein comparing the threshold voltage with the third signal waveform comprises detecting whether the third signal waveform has passed the threshold voltage (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount);

determining that the detecting object is the specific detecting object when a number of times in a row that the third signal waveform has passed the threshold

voltage exceeds a preset number of times (see paragraph 281, wherein since the contact detection 170 detects when a change in the level of the detection signal occurs, in order to detected that a finger has come into contact with the electrode 31, the contact detector 170 outputs the photography start signal to the controller 160, the contact detector necessarily detects at least 1 occurrence of a change in signal level).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein comparing the threshold voltage with the third signal waveform comprises detecting whether the third signal waveform has passed the threshold voltage, and determining that the detecting object is the specific detecting object when a number of times in a row that the third signal waveform has passed the threshold voltage exceeds a preset number of times", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 43**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 40. Morikawa fails to specifically disclose claimed "wherein the threshold voltage is set to a voltage that is higher than an upper limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the threshold voltage is set to a voltage that is higher than an upper limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount, wherein it would be obvious that in order to determine between the two cases of finger presence and no finger presence, the difference from the threshold must be greater than the maximum signal value when no finger is present).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the threshold voltage is set to a voltage that is higher than an upper limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface", for the purpose of determining that a finger is between electrodes 31a and 31b.

Regarding **claim 44**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 40. Morikawa fails to specifically

disclose claimed "wherein the threshold voltage is set to a voltage that is lower than a lower limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein the threshold voltage is set to a voltage that is lower than a lower limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting surface (see paragraph 281 wherein it is disclosed that the contact detector 170 detects that a finger is between electrodes 31a and 31b from a change in the level of the detection signal, wherein it would be obvious that in order to calculate a change in the detection signal, a reference threshold signal value would be needed to compare to, wherein it would be obvious that a difference between the reference signal value and the current signal value must be at least some amount, wherein it would be obvious that in order to determine between the two cases of finger presence and no finger presence, the difference from the threshold must be greater than the minimum signal value when no finger is present).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Morikawa and Setlak, by specifically providing "wherein the threshold voltage is set to a voltage that is lower than a lower limit value of the third signal waveform excited to the second detection electrode in a state in which at least the detecting object does not come into contact with the detecting

surface", for the purpose of determining that a finger is between electrodes 31a and 31b.

8. *Claims 29-37* are rejected under 35 U.S.C. 103(a) as being unpatentable over Morikawa in view of Setlak, and further in view of Iihama (US Patent Application Publication 2002/0014530), hereinafter referenced as Iihama.

Regarding **claim 29**, the combination of Morikawa and Setlak discloses everything as applied above in regards to claim 1. However, the combination fails to disclose claimed "wherein a time constant, which is defined by a resistance component between the detecting surface and the ground potential and a capacitance component added to the detecting surface, is set to a value in a range of 0.2 to 0.3 usec". However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, as taught by Iihama, to provide:

wherein a time constant, which is defined by a resistance component between the detecting surface and the ground potential and a capacitance component added to the detecting surface, is set to a value in a range of 0.2 to 0.3 usec (see Setlak column 7 lines 16-22, wherein it is disclosed that the sensing elements may be .002 inches in diameter which is equal to 5.08×10^{-5} meters, which provides for an area A of 8.1×10^{-9} m^2, and it is also disclosed that the distance d between drive electrode layer 71 and the sensor electrode 78 is 1×10^{-6} meters, wherein Morikawa discloses in paragraph 134 that the insulating film is made of silicon nitride, wherein, silicon nitride is known to have a dielectric constant ε_r of 6.5, as can be seen in the citation of pertinent art in regards to

Ma, wherein thus the capacitance between the drive electrode and sensing electrode can be calculated to be 0.47 nF since $C=\varepsilon_r \varepsilon_o (A/d)$, and ε_o is a constant known to be $8.854x10^{-12}$ F/m. Further, Iihama discloses in paragraph 83 that in order to release satisfactorily the static electricity charged in the finger FN in contact with the static electricity protection conductive layer 23, the drawing wire 24 is determined to allow the wiring resistance 24a to be about 30 ohms or less, wherein Iihama shows in figure 16 that this lead wire connects the conductive layer 23 to ground, wherein even taking the highest suggested by Iihana, 30 ohms, would result in a time constant $\tau = R \times C = 14.1$ n sec = 0.0141 u sec. While this number is not in the range of 0.2 to 0.3 usec, the examiner maintains that it would have been an obvious design choice to one of ordinary skill in the art that the area of the sensor or the distance between the drive electrode and the sensor electrode could be adjusted, and that some adjustments would have a result in the range of 0.2 to 0.3 usec).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to modify Morikawa, by specifically providing " wherein a time constant, which is defined by a resistance component between the detecting surface and the ground potential and a capacitance component added to the detecting surface, is set to a value in a range of 0.2 to 0.3 usec", as taught by Iihana, for the purpose of satisfactorily releasing the static electricity charged in the finger in contact with the static electricity protection conductive layer.

Regarding **claim 30**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 29. In addition, Morikiawa discloses: wherein the resistance component includes electrical resistance of the first detection electrode (see paragraph 276, wherein it is disclosed that electrode 31a is made of indium tin oxide, which inherently has a resistance associated with it).

Regarding **claim 31**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 29. In addition, the combination discloses:

wherein the capacitance component includes electrostatic capacitance between the first detection electrode and the counter electrode and between the first detection electrode and the sensors (see Setlak column 7 lines 3-12 and figures 8 and 9, wherein a capacitance it disclosed between the sensing electrode 78 and the excitation electrode 71. In addition, the detection electrode 31a and the sensor in Morikawa will inherently have a capacitance between them since they are two conductors spaced apart by insulation).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to modify Morikawa, by specifically providing "wherein the capacitance component includes electrostatic capacitance between the first detection electrode and the counter electrode and between the first detection electrode and the sensors", as taught by Setlak, for the purpose of having an

electrode opposite the sensing electrode to have an additional protection against fingerprint spoofing, as also discussed in claims above.

Regarding **claim 32**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 29. In addition, the combination discloses:

wherein the time constant is set to 0.2 to 0.25 u sec (see Setlak column 7 lines 16-22, wherein it is disclosed that the sensing elements may be .002 inches in diameter which is equal to 5.08×10^{-5} meters, which provides for an area A of 8.1×10^{-9} m^2, and it is also disclosed that the distance d between drive electrode layer 71 and the sensor electrode 78 is 1×10^{-6} meters, wherein Morikawa discloses in paragraph 134 that the insulating film is made of silicon nitride, wherein, silicon nitride is known to have a dielectric constant ε_r of 6.5, as can be seen in the citation of pertinent art in regards to Ma, wherein thus the capacitance between the drive electrode and sensing electrode can be calculated to be 0.47 nF since $C=\varepsilon_r \varepsilon_o (A/d)$, and ε_o is a constant known to be $8.854x10^{-12}$ F/m. Further, Iihama discloses in paragraph 83 that in order to release satisfactorily the static electricity charged in the finger FN in contact with the static electricity protection conductive layer 23, the drawing wire 24 is determined to allow the wiring resistance 24a to be about 30 ohms or less, wherein Iihama shows in figure 16 that this lead wire connects the conductive layer 23 to ground, wherein even taking the highest suggested by Iihana, 30 ohms, would result in a time constant $\tau = R \times C = 14.1$ n sec = 0.0141 u sec. While this number is not in the range of 0.2 to 0.25 usec, the

examiner maintains that it would have been an obvious design choice to one of ordinary skill in the art that the area of the sensor or the distance between the drive electrode and the sensor electrode could be adjusted, and that some adjustments would have a result in the range of 0.2 to 0.25 usec).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to modify Morikawa, by specifically providing " wherein the time constant is set to 0.2 to 0.25 u sec", as taught by Iihana, for the purpose of satisfactorily releasing the static electricity charged in the finger in contact with the static electricity protection conductive layer.

Regarding **claim 33**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 29. In addition, the combination discloses:

wherein the resistance component has a sheet resistance value of 30 Ω (see Iihama paragraph 83 wherein in order to release satisfactorily the static electricity charged in the finger FN in contact with the static electricity protection conductive layer 23, the drawing wire 24 is determined to allow the wiring resistance 24a to be about 30 ohms or less).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to modify Morikawa, by specifically providing "wherein the resistance component has a sheet resistance value of 30 Ω", as

taught by Iihana, for the purpose of satisfactorily releasing the static electricity charged in the finger in contact with the static electricity protection conductive layer.

Regarding **claim 34**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 29. In addition, the combination discloses:

wherein the capacitance component has a capacitance having a value set to approximately 7 to 10 nF (see Setlak column 7 lines 16-22, wherein it is disclosed that the sensing elements may be .002 inches in diameter which is equal to 5.08×10^{-5} meters, which provides for an area A of 8.1×10^{-9} m^2, and it is also disclosed that the distance d between drive electrode layer 71 and the sensor electrode 78 is 1×10^{-6} meters, wherein Morikawa discloses in paragraph 134 that the insulating film is made of silicon nitride, wherein, silicon nitride is known to have a dielectric constant ε_r of 6.5, as can be seen in the citation of pertinent art in regards to Ma, wherein thus the capacitance between the drive electrode and sensing electrode can be calculated to be 0.47 nF since $C=\varepsilon_r \varepsilon_o (A/d)$, and ε_o is a constant known to be 8.854×10^{-12} F/m. While this number is not in the range of 7 to 10 nF, the examiner maintains that it would have been an obvious design choice to one of ordinary skill in the art that the area of the sensor or the distance between the drive electrode and the sensor electrode could be adjusted, and that some adjustments would have a result in the range of 7 to 10 nF).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to modify Morikawa, by specifically

providing " wherein the capacitance component has a capacitance having a value set to approximately 7 to 10 nF", as taught by Iihana, for the purpose of having an electrode opposite the sensing electrode to have an additional protection against fingerprint spoofing, as also discussed in claims above.

Regarding **claim 35**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 29. In addition, Morikawa discloses:

wherein each sensor of the sensor array comprises a photosensor having a light receiving surface (see paragraphs 245-246);

the first detection electrode has an area larger than a light receiving area of the sensor array (see paragraph 286 and figure 47);

the first detection electrode comprises a transparent electrode film formed on an upper portion of the light receiving area of the sensor array with the interlayer insulating film provided between the upper portion of the light receiving area and the transparent electrode film (see paragraph 276 in regards to electrode 31a made of indium tin oxide, and further see figure 38);

wherein the photosensors receive light in the light receiving area through the first detection electrode and the interlayer insulating film (see figure 23 and paragraphs 134 and 194).

Regarding **claim 36**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 35. The combination fails to specifically

disclose claimed the limitations of claim 36. However, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to provide:

wherein conductive member having a resistance value that is lower than a resistance value of the transparent conductive film is provided to be electrically connected to an area besides an area corresponding to at least a light receiving area of the transparent conductive film (see paragraph 277 wherein electrode 31b is connected with a wire to ground so that the electrostatic electricity is discharged to the ground, wherein it would be obvious to one of ordinary skill in the art to make this resistance smaller then the resistance associated with electrode 31a so that the electrostatic electricity travels along the wire out of electrode 31b).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention, to modify Morikawa, by specifically providing "wherein conductive member having a resistance value that is lower than a resistance value of the transparent conductive film is provided to be electrically connected to an area besides an area corresponding to at least a light receiving area of the transparent conductive film", for the purpose of having electrostatic electricity discharged to ground.

Regarding **claim 37**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 36. In addition, Morikiawa discloses:

wherein the resistance component includes electrical resistance formed by the transparent conductive film and the conductive member (see paragraph 276, wherein it is disclosed that electrode 31a and electrode 31b are made of a transparent conductive film indium tin oxide, which inherently has a resistance associated with it).

9. *Claim 38* is rejected under 35 U.S.C. 103(a) as being unpatentable over Morikawa in view of Setlak, and further in view of Iihama, and even further in view of Manchanda et al. (US Patent 6,240,199), hereinafter referenced as Manchanda.

Regarding **claim 38**, the combination of Morikawa, Setlak, and Iihama discloses everything as applied above in regards to claim 36. However, the combination fails to disclose claimed "wherein the conductive member comprises one of chromium, aluminum, an alloy material containing chromium, and an alloy material containing aluminum". However, the examiner maintains that it would have been obvious at the time of the invention, in view of Manchanda, to provide:

wherein the conductive member comprises one of chromium, aluminum, an alloy material containing chromium, and an alloy material containing aluminum (see Manchanda column 3 line 67 through column 4 line 3, wherein it is disclosed that aluminum is often used in sensors because of its low resistance, wherein it would have been obvious to desire a low resistance material for electrode 31b since it was disclosed in Iihama and discussed above that a low resistance is needed to have the electrostatic electricity go to ground).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Morikawa by specifically providing "wherein the conductive member comprises one of chromium, aluminum, an alloy material containing chromium, and an alloy material containing aluminum", as taught by Manchanda, for the purpose of having a low resistance electrode in order to ground the electrostatic electricity.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL ZEILBERGER whose telephone number is

(571)270-3570. The examiner can normally be reached on M-F 8:30-6pm est (alternate Fridays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571)272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Daniel Zeilberger
Examiner
Art Unit 2624

DZ
10/06/2008

/Vikkram Bali/
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